

REMARKS

Claim Rejections

Claims 1, 2, 6, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tao (2002/0015877) in view of any one of Eylem et al. (7160647) or Coetzer et al. (4366215).

Arguments

In the of the outstanding Office Action, the Examiner determined that, based on a formula $\text{La}_x\text{Mn}_y\text{A}_a\text{B}_b\text{C}_c\text{O}_d$ where

A is an alkaline earth metal,

B is selected from the group consisting of scandium, yttrium, and a lanthanide metal

C is select from the group consisting of titanium, vanadium, chromium, iron, cobalt, nickel, copper, zinc, zirconium, hafnium, aluminum, and antimony

x is from 0 to about 1.05,

y is from 0 to about 1,

a is from 0 to about 0.5,

b is from 0 to about 0.5,

c is from 0 to about 0.5, and

d is between about 1 and about 5, and

at least one of x, y, a, b, and c is greater than zero, the formula CuO_3 should be met by the above-mentioned formula.

In response to the Examiner's assertion, Applicant notes the following:

(1) If a molecule contains more than one atom of a particular element, this quantity is indicated using a subscript after the chemical symbol. For ionic compounds, the subscripts indicate the ratio of elements in the empirical formula. Integers are most often used for each element. For example, carbon dioxide is always expressed as CO_2 rather than $\text{C}_{0.5}\text{O}$.

(2) However, for non-stoichiometric compounds or foreign ion doped compounds, their formula cannot be represented by small integers. Such a formula might be written using decimal fractions, as in $\text{Fe}_{0.95}\text{O}$, or $\text{La}_{0.84}\text{Sr}_{0.16}\text{MnO}_3$.

(3) Therefore, it is clear that LnCuO_3 definitely has different chemical and structural meaning from C_cO_d in $\text{La}_x\text{Mn}_y\text{A}_a\text{B}_b\text{C}_c\text{O}_d$ where c is specified from 0 to about 0.5. In LnCuO_3 , all copper ions are located specific cation lattice. On the other hand, in $\text{La}_x\text{Mn}_y\text{A}_a\text{B}_b\text{C}_c\text{O}_d$, C cations partially replaced Mn ions with the fraction less than 50%.

(4) In Tao's invention, $\text{La}_x\text{Mn}_y\text{A}_a\text{B}_b\text{C}_c\text{O}_d$ with
a is from 0 to about 0.5,
b is from 0 to about 0.5,
c is from 0 to about 0.5.

To an ordinary chemist or material scientist, such a chemical formula clearly expresses that A, B, and C are foreign doping cations with less than 50% occupancy at either La or Mn cation lattices which is completely different from Applicant's recited invention.

The Examiner also argues that Tao teaches introducing ions having valence numbers of less than four in a lattice structure (trivalent copper is an ion having a valence number of less than four, paragraph 0037, lines 25-30) in a lattice structure for the purpose of having extra oxygen anion vacancies in the crystal lattice (paragraph 0037, lines 27-30). Therefore, the Examiner states that it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide introduced ions having a valence number of less than four, paragraph 0037, lines 25-30) in a lattice structure in Tao in order to have extra oxygen anion vacancies in the crystal lattice (paragraph 0037, lines 27-30) as taught by Tao.

In response, Applicant notes the following points:

(1) Tao teaches that substituting tetravalent zirconium ions, Zr^{+4} , in the crystal lattice with metal ions having a valence number of less than four reduces a required number of oxygen anions in the lattice to achieve charge neutrality.

Consequently, such doped materials have extra oxygen anion vacancies in the crystal lattice.

In Tao's invention, it is obvious that the substitution of metal ions having valence number of less than four for zirconium ions, Zr^{+4} is to enhance the ionic conductivity of zirconia (ZrO_2) to be used as the electrolyte material (paragraph 0037, lines 9-10). In comparison, in the present invention the copper ions do not substitute tetravalent zirconium ions, Zr^{+4} . Instead, the present invention is designated for cathode material and not for the electrolyte material. Therefore, it would have not been obvious to one of ordinary skill in the art.

Moreover, based on the crystal chemistry, to substitute tetravalent zirconium ions, Zr^{+4} , the metal ions should have an ionic radius larger than 0.102 nm. A copper ion is too small to replace tetravalent zirconium ions, Zr^{+4} . In other words, it is very difficult to incorporate copper ion into a ZrO_2 lattice.

Coetzer et al. is cited as teaching a solid oxide cathode and an alkaline earth anode. Applicant does not acquiesce to this characterization and further notes that the reference fails to provide the above-noted deficiencies of Tao et al. Eylem et al. also fails to do so.

Applicant further submits that there is not the slightest suggestion in either Tao et al. or Coetzer et al. that their respective teachings may be combined as suggested by the Examiner. Case law is clear that, absent any such teaching or suggestion in the prior art, such a combination cannot be made under 35 U.S.C. § 103.

Neither Tao et al. nor Coetzer et al. disclose, or suggest a modification of their specifically disclosed structures that would lead one having ordinary skill in the art to arrive at Applicant's claimed structure. Applicant hereby respectfully submits that no combination of the cited prior art renders obvious Applicant's claims.

Application No. 10/796,976

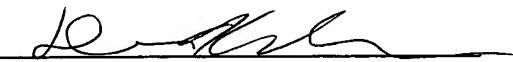
Summary

In view of the foregoing remarks, Applicant submits that this application is now in condition for allowance and such action is respectfully requested. Should any points remain in issue, which the Examiner feels could best be resolved by either a personal or a telephone interview, it is urged that Applicant's local attorney be contacted at the exchange listed below.

Respectfully submitted,

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